

PRECISION SURFACE MINING



Guinea mine reaps benefits of precision surface mining

The Boké Mine in Guinea, Africa, holds some of the world’s highest-quality bauxite deposits. To efficiently extract, process and transport the material from the mine, located approximately 30 kilometers (18.6 miles) from the northern shores of the Rio Nuñez in Boké Prefecture, the mining company, SMB (Société Minière de Boké) was formed in 2014. Today, SMB is one of the fastest growing members of the Guinean economic mining landscape.

SMB was established through a strategic alliance between Winning Shipping Ltd, UMS International Ltd, Shandong Weiqiao, and the State of Guinea, with each member of the consortium serving a vital role in the mining operation. SMB operates the mine, extracting bauxite ore, while UMS transports material from the mine via the only road to the specially built Port of Katougouma on the Rio Nuñez river. The port was constructed by Winning Shipping over a two-year period, and it has four wharves to accommodate the 178,000 metric tons (196.000 US tons) barges that carry the bauxite to the Shandong Weiqiao facility in China.

Searching for a more efficient way

The consortium is committed to optimizing all aspects of their operations. A few years ago, the group started looking into alternative mining methods, and it was then that members of the consortium first visited a surface mine in Australia to learn about precision surface mining methods. Onsite, the team got its first look at the Vermeer T1255 Commander® 3 Terrain Leveler® surface excavation machine (SEM).

“We had several questions about the efficiency of surface excavation equipment,” Rui Shiliang, executive personal assistant to the

president of the Winning International Group recalled. “It was clear that using a machine like the Terrain Leveler SEM could help us reduce our labor costs, but we needed to determine what the overall cost comparison would be for an operation like ours.”

In addition to visiting with several other mining operations and contractors using surface excavation machines for road construction, SMB invited the team from the Vermeer West Africa dealership to come out for a visit.

While there, the group gathered rock samples to ship back to the ermeer Rock Lab located at the manufacturer’s headquarters in Pella, Iowa, U.S.A. The experts at the lab conducted unconfined compressive strength, indirect tension, abrasivity, density and energy index testing to help determine how the material would respond when being cut. Based on that information, the local dealer helped SMB estimate production and service expenses associated with using the Vermeer Terrain Leveler SEM.

Impressed with the results of the testing, associated production and cost estimates and the responsiveness they received from their Vermeer dealer, the SMB group decided to give precision surface mining a try.

Side-by-side comparison

SMB invested in two Vermeer Terrain Leveler SEM’s for the mine and made arrangements to run the machines in conjunction with its drilling and blasting methods. The mine was divided into two areas, so the team could get a side-by-side comparison.

“Drilling usually occurs a week ahead of blasting and involves several drilling machines to produce a five-by-five meter (16x16 foot) grid of boreholes,” Shiliang explained. “Around a week after the drilling



process is complete, we’ll then come through and blast. Around 50,000 to 100,000 metric tons (55.000 – 110.000 US tons) of bauxite is extracted each time. The material produced ranges in size, so additional screening and crushing is necessary, which can certainly have a major impact on our operational costs.”

SMB found precision surface mining methods to be much more straightforward, with less prep time and fewer steps involved. Using top-down cutting, the Terrain Leveler SEM is able to work the ground layer by layer, while producing consistently sized product that does not typically require additional screening or crushing. Smaller-size product justifies the use of regular trucks over high-weight/high-cost mining trucks and can be more cost efficient.

In addition, the Vermeer Terrain Leveler SEM offers maneuverability, which allows the opertor to surface mine more selectively in small areas and perform on slopes up to 20 degrees. And, according to Shiliang, the SMB consortium has been impressed with this new way of surface mining. “Overall, using the Terrain Leveler SEM machines is more cost efficient than drilling and blasting for our operation,” he explained. “We are saving on labor expenses and have been able to reduce the number of times that material has to be handled.”

Shiliang also noted that loading trucks in the cut has been more efficient since the Terrain Leveler SEM surface mined surface area is much smoother. “We spend less time preparing and maintaining haul roads, maneuvering trucks in and out of the cut, and there is significantly less damage to tires,” he said.

Making the cut

In the first year of operating two Vermeer Terrain Leveler SEM machines at the Boké mine, SMB estimated each unit produced

around 2.75Mtpa (3 million US tons) of ore with a mechanical availability in the range of 90-92 percent. Those totals have continued to rise each year after, and the group expects increased production of ore per unit in 2018.

Getting support

Another area of concern the SMB consortium had as it explored surface excavation machinery was what they could expect for parts and service support. “Since our operation is in a remote area, dealer support is always a major concern with every machine in our fleet,” Shiliang explained. “Before selecting the Vermeer Terrain Leveler SEM, we vetted a few manufacturers and their dealers so we could determine how well they would support our team in the field. The Vermeer West Africa dealer, along with the Vermeer team in Europe and the United States, were accommodating during that process, and they have done a tremendous job of supporting us since then.”

Shiliang went on to say it felt like Vermeer was providing a service, instead of merely trying to sell him a machine. “There was a lot we didn’t know about this new way of surface mining, and we had a lot of questions,” he explained. “They helped determine the best way to use the surface excavation machines at our facility. Any time we’ve had a machine-related issue, Vermeer West Africa has been quick to deliver onsite support and any needed parts. That level of support helps to maximize our run time.”

Plans for the future

After comparing precision surface mining to drilling and blasting, SMB plans to incorporate more surface excavation machines into its operations. However, the group still plans to use drilling and blasting methods in areas of the mine where it’s challenging to load material due to the extreme steep inclines.

“We’ve been able to prove that precision surface mining methods can be cost-efficient for bauxite mining operations,” Shiliang said. “These machines are really the future of where our company and the industry are going.”

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